US009404671B2

(12) **United States Patent**
Liang

(10) **Patent No.: US 9,404,671 B2**
(45) **Date of Patent: Aug. 2, 2016**

(54) **RADIANT HEAT LIFTING DEVICE FOR OUTDOOR FLAME HEATER**

(71) Applicant: **Hsin-Lien Liang**, Taoyuan Hsien (TW)

(72) Inventor: **Hsin-Lien Liang**, Taoyuan Hsien (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 640 days.

(21) Appl. No.: **13/860,744**

(22) Filed: **Apr. 11, 2013**

(65) **Prior Publication Data**

US 2014/0305428 A1 Oct. 16, 2014

(51) **Int. Cl.**

F23D 14/14	(2006.01)
F24H 9/00	(2006.01)
F24H 3/00	(2006.01)
F23D 14/12	(2006.01)
F24H 3/04	(2006.01)

(52) **U.S. Cl.**

CPC ***F24H 9/0073*** (2013.01); ***F23D 14/125*** (2013.01); ***F24H 3/006*** (2013.01); ***F24H 9/0068*** (2013.01); *F24H 3/0417* (2013.01)

(58) **Field of Classification Search**

CPC F24H 9/0073; F24H 3/006; F24H 9/0068; F24H 3/0417; F23D 14/125; F23D 14/12; F23D 2213/00; F23D 2212/00; F24C 15/22; F24C 3/14; F24C 15/06; F24C 15/007; F24C 15/08; F24C 15/12; F24C 3/002; F24C 3/004; F23C 3/002

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2013/0160756 A1* 6/2013 Yen ..... F24C 3/14 126/275 R

* cited by examiner

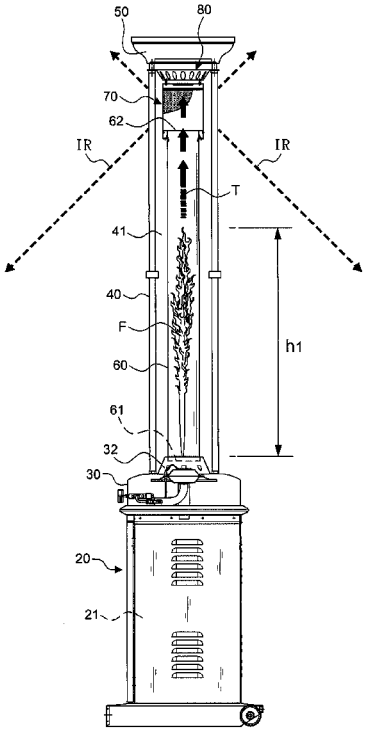
Primary Examiner — Alfred Basichas

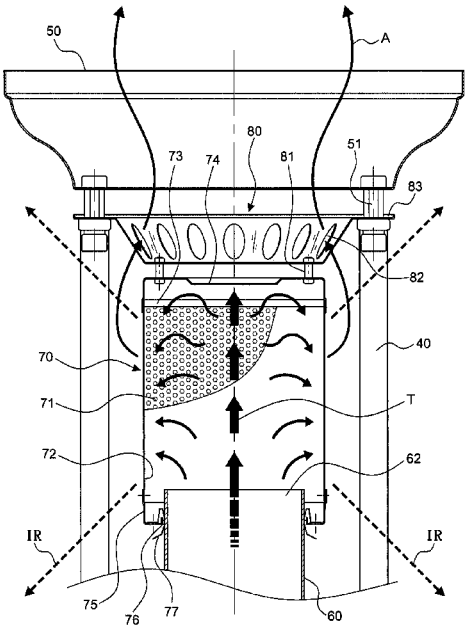
(74) *Attorney, Agent, or Firm* — Rosenberg, Klein & Lee

(57) **ABSTRACT**

A radiant heat lifting device for outdoor flame heater comprises a glass tube having a section of heat-resistant net tube made of high-temperature resistant material and mounted on an upper opening thereof; a heat-resistant net tube including countless meshes at a periphery thereof, a top outlet sealed and a bottom outlet connected to the upper opening of the glass tube; and a cover being a bowl-shaped arranged on the heat-resistant net tube and including a multitude of circulation holes at a periphery thereof; whereby a flame emitted from the flame outlet along the glass tube up to the top outlet of the heat-resistant net tube by chimney effect to accumulate the heat and produce infrared to increase the radiation thermal of the glass tube; an exhaust in the glass tube outflows from the meshes of the heat-resistant net tube to the circulation holes of the cover and discharges upward.

8 Claims, 7 Drawing Sheets





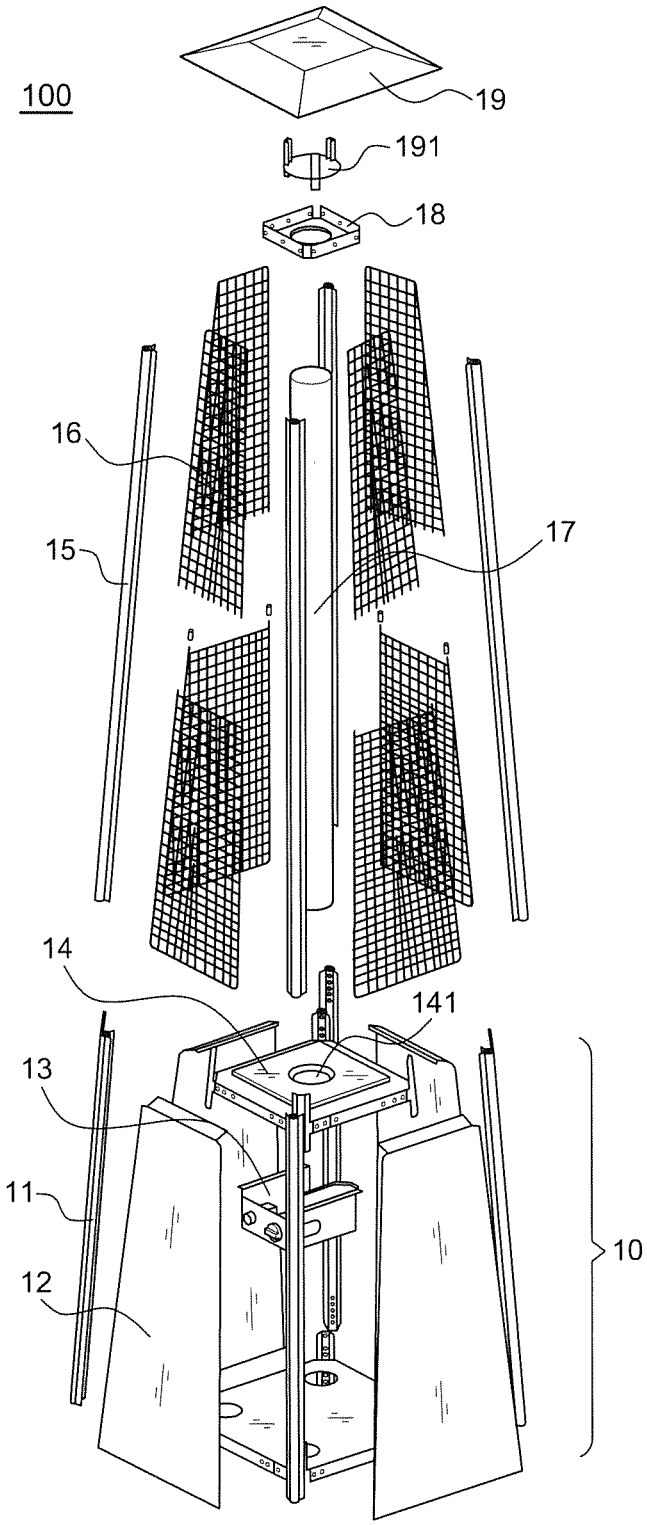


FIG.1A
PRIOR ART

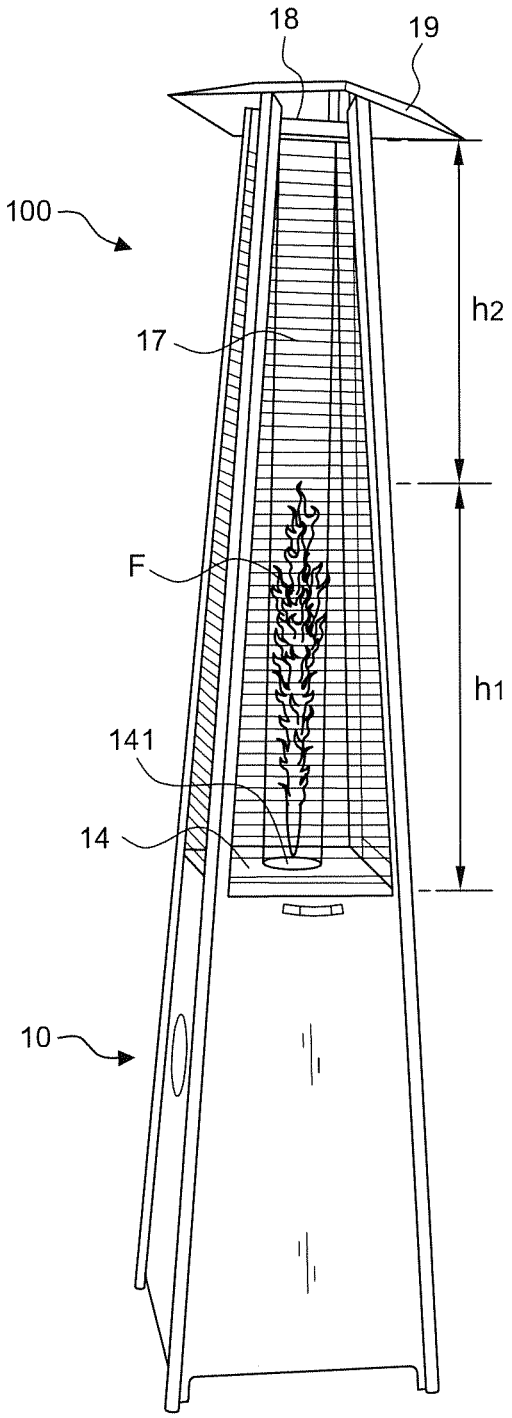


FIG.1B
PRIOR ART

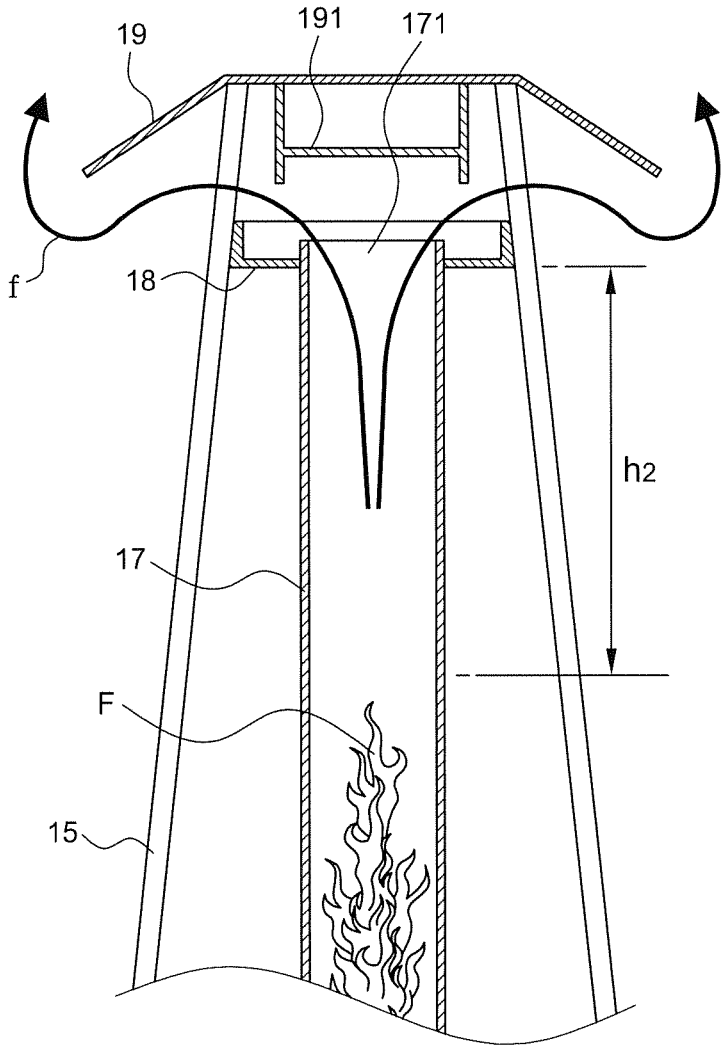


FIG.1C
PRIOR ART

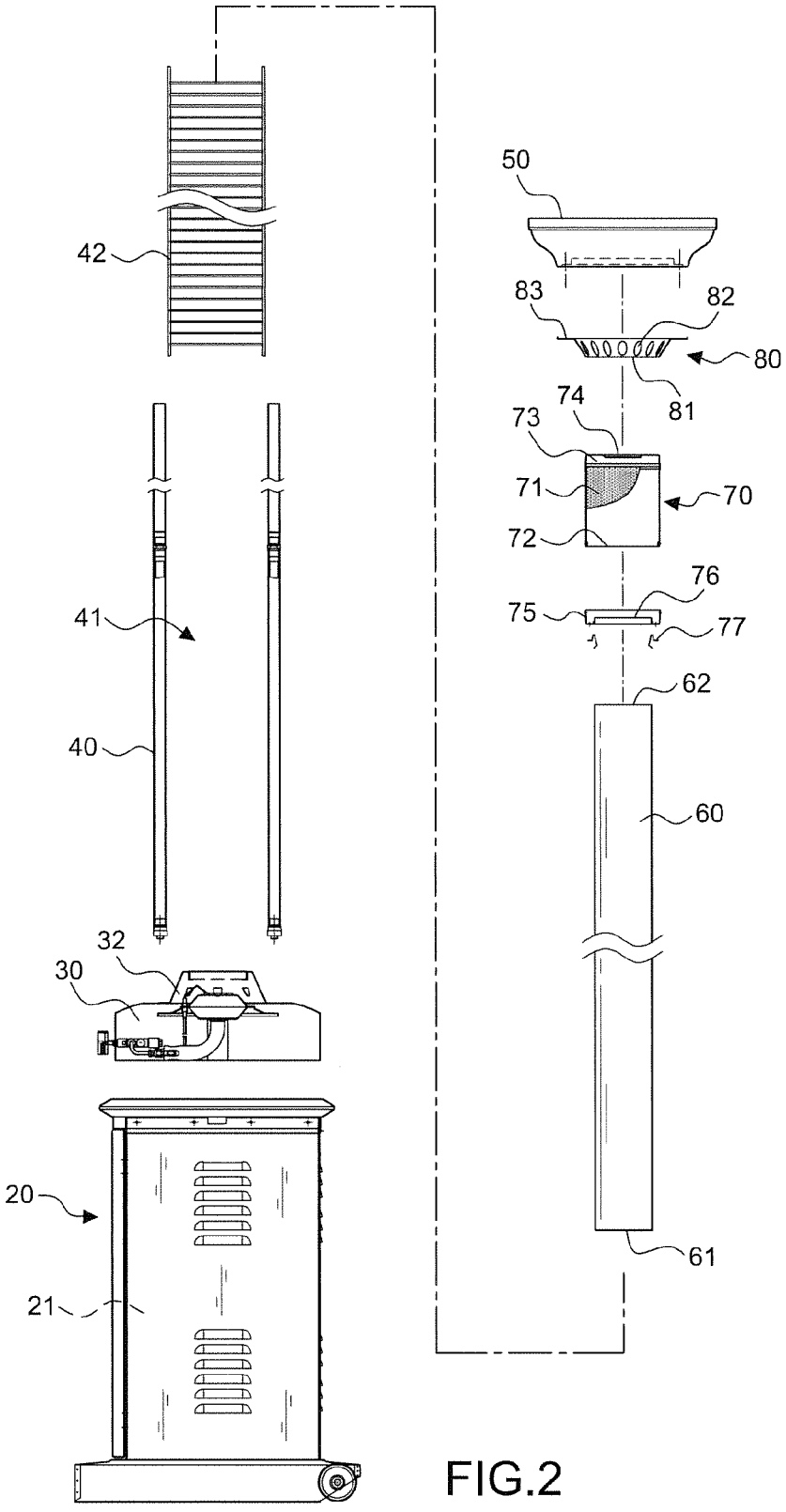


FIG.2

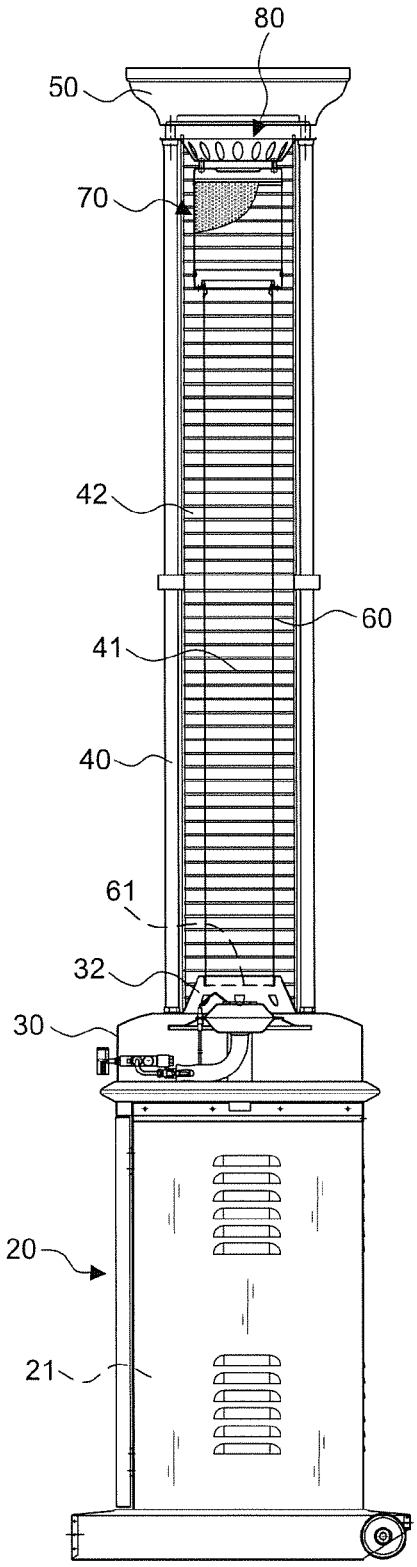


FIG.3

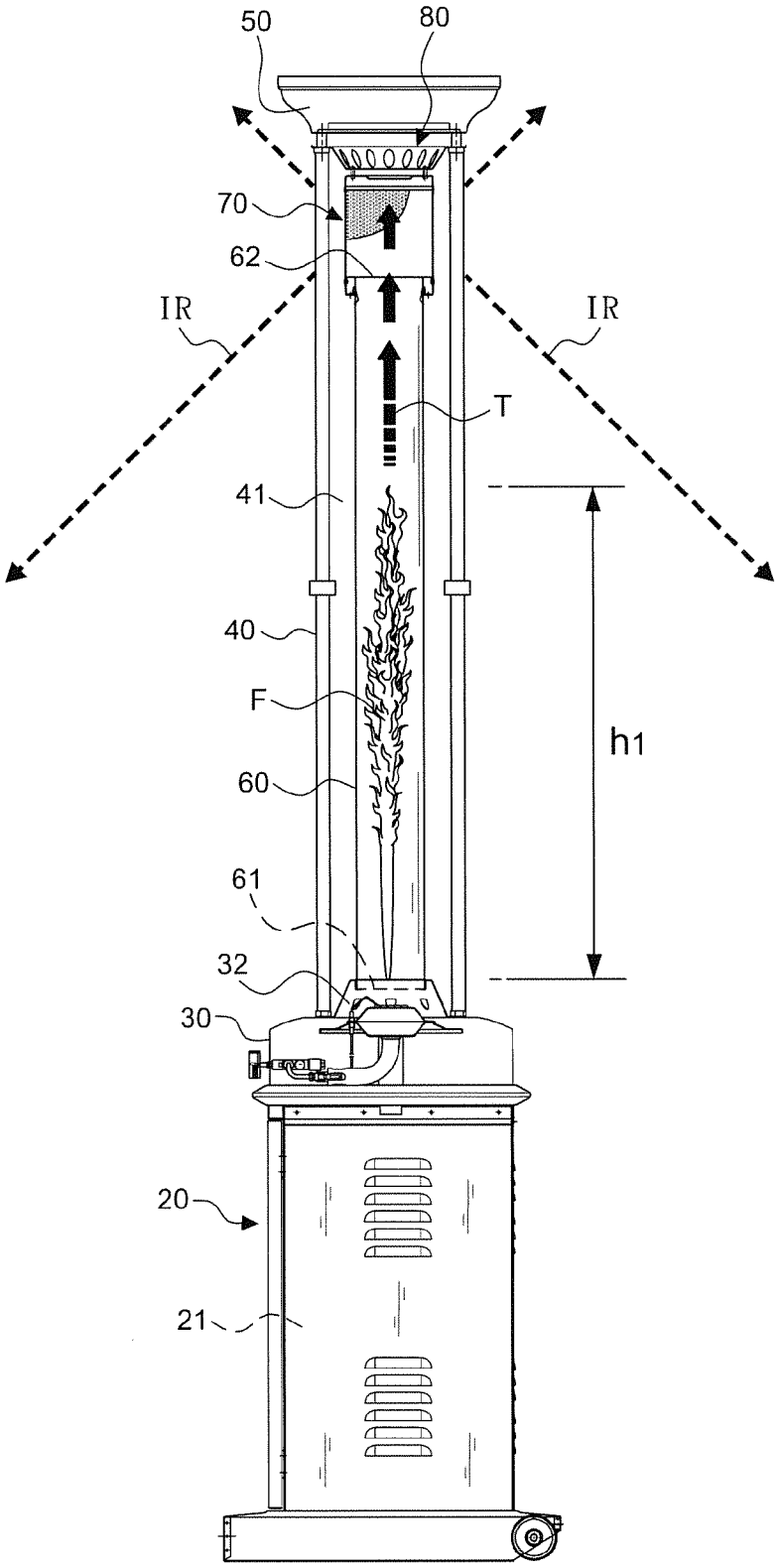


FIG.4

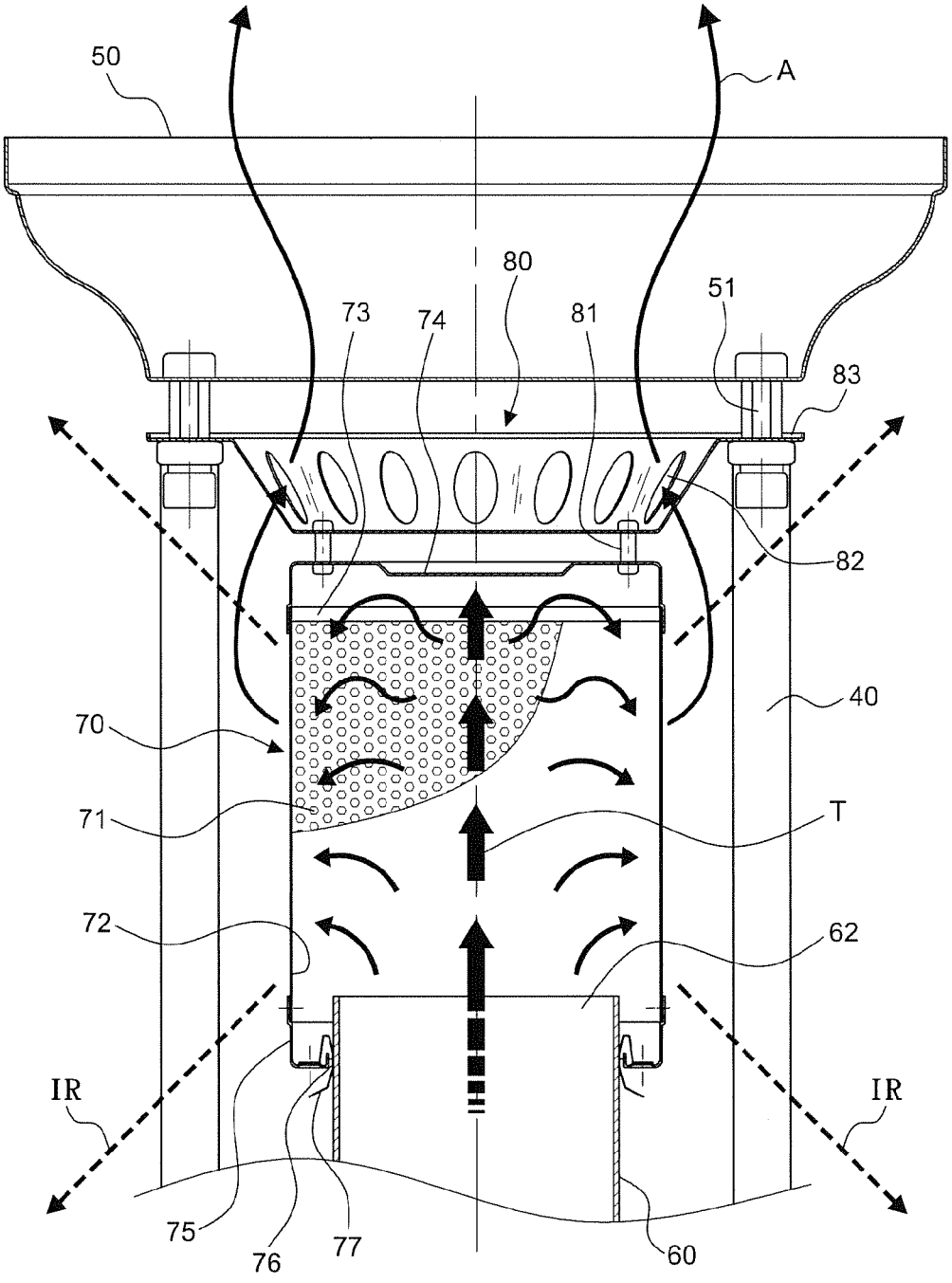


FIG.5

RADIANT HEAT LIFTING DEVICE FOR OUTDOOR FLAME HEATER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to an outdoor flame heater, and more particularly to the radiant heat lifting device having a heat-resistant net tube mounted on a top of a glass tube for accumulating the heat of a flame and producing infrared to increase the radiation thermal of the heater and thus enhance the effect of the outdoor heating.

2. Description of the Related Art

With reference to FIGS. **1**A through **1**C, US Patent Public No. 2010/0236544 A1 discloses an outdoor flame heater **100** comprising: a bottom housing **10** being composed of a set of four lower support members **11**, a set of four panels **12**, and other relative members for installing a gas barrel (not shown); a control box **13** releasing a flame to a gas flame outlet **141** of a base **14** on a top of control box **13**; a set of four upper support members **15** together with a plurality of protection guards **16** forming a space for installing a glass tube **17**; and a reflector **19** mounted onto a damper **191** and the damper **191** mounted on the upper plate **18** being affixed to the upper support members **15**.

Base on the prior features disclosed, a flame F in the glass tube **17** is extended upward by the chimney effect, and the thermal energy radiates from the glass tube **17** while an upper outlet **171** of the glass tube **17** discharges an exhaust gas. Such flame heater **100** not only has a heating function but provides a visual perception of exuberant vitality by looking at the flaming flame. The flame heater **100** also increases the atmosphere and decoration. According to the safety regulations, the overall height of the flame heater **100** is at least 200 cm above to avoid people being in danger of the flame from a top end of the glass tube **17**.

Therefore, the kind of flame heater **100** has some drawbacks; for example, the height of the flame heater demanded over 200 cm to comply with the safety regulations but the height h**1** of the flame F is only ½~⅔ height of the glass tube **17**; such that there is no flame at an upper region h**2** of the glass tube **17**. With the reference to FIG. **1**C, the heat f from the flame F is discharged through the upper outlet **171** of the glass tube **17**, resulting in low temperature at the upper region h**2** of the glass tube **17** and affecting the heating effect. Therefore, there is room for improvement.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide a radiant heat lifting device for outdoor flame heater, which provides a heat-resistant net tube mounted on a top of a glass tube for accumulating the heat of a flame and producing infrared to increase the radiation thermal of the heater and thus enhance the effect of the outdoor heating.

In order to achieve the above object, the invention includes: a housing providing an inside space for installing a gas barrel; a base mounted on the housing and having a burner therein and a flame outlet at a top thereof; a plurality of support members standing straight on the housing and having a bottom end arranged at a periphery of the flame outlet; a frame body arranged at a top of the plurality of support members and having a mounted space between the pluralities of support members; a glass tube having a lower opening mounted on the flame outlet for positioning the glass tube in the mounted space between the pluralities of support members; wherein the glass tube has a section of heat-resistant net tube made of high-temperature resistant material and mounted on an upper opening thereof; the heat-resistant net tube includes countless meshes at a periphery thereof, a top outlet sealed and a bottom outlet connected to the upper opening of the glass tube; and a cover being a bowl-shaped, arranged on the heat-resistant net tube and including a multitude of circulation holes at a periphery thereof; whereby a flame emitted from the flame outlet along the glass tube up to the top outlet of the heat-resistant net tube by chimney effect to heat the heat-resistant net tube, and after accumulating the heat, the heat-resistant net tube produces infrared to increase the radiation thermal of the glass tube; an exhaust in the glass tube outflows from the meshes of the heat-resistant net tube to the circulation holes of the cover and discharges upward.

Base on the features disclosed, the preferred embodiment of the present invention comprises the heat-resistant net tube has a lid body sealed the top outlet thereof and an annular sleeve body mounted on the bottom outlet and the annular sleeve body has an inserted hole at a bottom edge thereof for inserting the upper opening of the glass tube and a plurality of elastic pieces at a periphery thereof for positioning the upper end of the glass tube.

Further, the cover includes a bottom surface locked at a top of the lid body by a plurality of bolts.

Further, the cover further includes a convex ring at a top periphery thereof and the convex ring is locked between a top end of the plurality of support members and a bottom surface of the frame body by a plurality of bolts.

Base on the features disclosed, the design of the present invention provides the combination of the heat-resistant net tube and cover to increase the radiation thermal of the heater, which solves the problem of previous heater being lack of high temperature on the top thereof, and thus enhance the effect of the outdoor heating. Moreover, there is not any baffle plates between the heat-resistant net tube and glass tube to block the infrared of heat-resistant net tube.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A, **1**B, and **1**C are schematic views of conventional outdoor flame heater;

FIG. **2** is an exploded schematic view of the present invention;

FIG. **3** is a schematic view of the present invention in a fully assembled state;

FIG. **4** is an application example view of the present invention; and

FIG. **5** is a sectional view of the main structures of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **2** through **5**, the preferred embodiment of a radiant heat lifting device for outdoor flame heater in accordance with the present invention comprises a housing **20** providing an inside space **21** for installing a gas barrel; a base **30** mounted on the housing **20** and having a burner **31** therein and a flame outlet **32** at a top thereof; a plurality of support members **40** standing straight on the housing **20** and having a bottom end arranged at a periphery of the flame outlet **32**; a frame body **50** arranged at a top of the plurality of support members **40** and having a mounted space **41** between the pluralities of support members **40**; a glass tube **60** having a lower opening **61** mounted on the flame outlet **32** for positioning the glass tube **60** in the mounted space **41** between the pluralities of support members **40**. The glass tube **60** is made

of quartz glass having a high-temperature resistant effect. In this embodiment, the present invention further comprises several pieces of protective wire mesh **42** fixing between the pluralities of support members **40** to avoid contacting with the high-temperature glass tube **60**. However, the above-mentioned structure is a prior art and thus will not be described in details here.

Referring to FIGS. **4** and **5**, the present invention is characterized in that the glass tube **60** has a section of heat-resistant net tube **70** made of high-temperature resistant material and mounted on an upper opening **62** thereof; the heat-resistant net tube **70** includes countless meshes **71** at a periphery thereof, a top outlet **73** sealed and a bottom outlet **72** connected to the upper opening **62** of the glass tube **60**. In this embodiment, the heat-resistant net tube **70** is made of a high-temperature resistant metal of the stamping forming or a heat-resistant ceramic. the heat-resistant net tube **70** has a lid body **74** sealed the top outlet **73** thereof and an annular sleeve body **75** mounted on the bottom outlet **72** and the annular sleeve body **75** has an inserted hole **76** at a bottom edge thereof for inserting the upper opening **62** of the glass tube **60** and a plurality of elastic pieces **77** at a periphery thereof for positioning the upper end of the glass tube **60**.

A cover **80** being a bowl-shaped arranged on the heat-resistant net tube **70** and including a multitude of circulation holes **82** at a periphery thereof. The cover **80** includes a bottom surface locked at a top of the lid body **74** by a plurality of bolts **81**. The cover **80** further includes a convex ring **83** at a top periphery thereof and the convex ring **83** is locked between a top end of the plurality of support members **40** and a bottom surface of the frame body **50** by a plurality of bolts **51**.

Whereby a flame emitted from the flame outlet **32** along the glass tube **60** up to the top outlet **73** of the heat-resistant net tube **70** by chimney effect to heat the heat-resistant net tube **70**, and after accumulating the heat, the heat-resistant net tube **70** produces infrared IR to increase the radiation thermal of the glass tube **60**; an exhaust A in the glass tube **60** outflows from the meshes **71** of the heat-resistant net tube **70** to the circulation holes **82** of the cover **80** and discharges upward.

Base on the features disclosed, the flame F reaches to a certain height h**1** as shown in FIG. **4**, and a high temperature T of an outer flame of the flame F extends through the heat-resistant net tube **70** to the sealed lid body **74** as shown in FIG. **5**, in order to accumulate the heat so that the heat-resistant net tube **70** produces the infrared IR to increase the radiation thermal of the glass tube **60**. On the contrary, if the high temperature T of the flame F is discharged without the sealed lid body **74** on the top of the heat-resistant net tube **70**, the heat-resistant net tube **70** may not accumulate the heat and produce the infrared IR. Therefore, the design of the present invention provides the combination of the heat-resistant net tube **70** and cover **80** to increase the radiation thermal of the heater, which solves the problem of previous heater being lack of high temperature on the top thereof, and thus enhance the effect of the outdoor heating. Moreover, there is not any baffle plates between the heat-resistant net tube **70** and glass tube **60** to block the infrared of heat-resistant net tube **70**.

What is claimed is:

1. A radiant heat lifting device for outdoor flame heater, comprising:

a housing defining an inside space for installing a gas barrel;

a base mounted on the housing and having a burner therein and a flame outlet at a top thereof;

a plurality of support members disposed on the housing and having a bottom end arranged at a periphery of the flame outlet;

a frame body arranged at a top of the plurality of support members, a mounted space being formed between the support members;

a glass tube having a lower opening at a first end thereof mounted on the flame outlet for positioning the glass tube in the mounted space between the support members;

a heat-resistant net tube made of high-temperature resistant material and mounted to extend longitudinally upward from an upper opening of the glass tube; the heat-resistant net tube including an intermediate portion having a plurality of mesh openings formed therethrough, the heat-resistant net tube having a top end sealed and a bottom outlet connected to the upper opening of the glass tube; and

a cover arranged on the heat-resistant net tube to be longitudinally displaced from the intermediate portion thereof, the cover including a multitude of circulation holes at a periphery thereof;

whereby a flame emitted from the flame outlet along the glass tube heats the heat-resistant net tube to thereby increase the thermal radiation of the glass tube; and an exhaust in the glass tube flows out through the mesh openings of the heat-resistant net tube to be discharged through the circulation holes of the cover.

2. The radiant heat lifting device for outdoor flame heater as recited in claim **1**, wherein a lid body seals the top end of the heat-resistant net tube, and an annular sleeve body is mounted on the bottom outlet of the heat-resistant net tube, and an inserted hole extending through a bottom edge of the annular sleeve body for receiving the upper opening of the glass tube and a plurality of elastic pieces are mounted at a periphery of the inserted hole for positioning an opposing second end of the glass tube.

3. The radiant heat lifting device for outdoor flame heater as recited in claim **2**, wherein a bottom surface of the cover is locked to a top of the lid body by a plurality of bolts.

4. The radiant heat lifting device for outdoor flame heater as recited in claim **3**, further comprising a convex ring at a top periphery of the cover, wherein the convex ring is locked between a top end of the plurality of support members and a bottom surface of the frame body by a plurality of bolts.

5. The radiant heat lifting device for outdoor flame heater as recited in claim **1**, wherein the glass tube is made of quartz glass.

6. The radiant heat lifting device for outdoor flame heater as recited in claim **1**, wherein the heat-resistant net tube is made of a high-temperature resistant metal of the stamping forming or a heat-resistant ceramic.

7. The radiant heat lifting device for outdoor flame heater as recited in claim **1**, further comprising a plurality of protective wire mesh pieces being fixed between the support members.

8. The radiant heat lifting device for outdoor flame heater as recited in claim **1**, wherein the cover is bowl-shaped.

* * * * *